

Claims

Claims 1-10 (cancelled).

Claim 11 (previously presented): A method of forming a nitrogen-enriched region within a silicon-oxide-containing layer, comprising:

 providing the silicon-oxide-containing layer over a substrate; the silicon-oxide-containing layer having a bare upper surface above the substrate and a lower surface on the substrate;

 exposing the silicon-oxide-containing layer to an activated nitrogen species from a nitrogen-containing plasma to introduce nitrogen into the silicon-oxide-containing layer and form a nitrogen-enriched region, the nitrogen-enriched region being only in an upper half of the silicon-oxide-containing layer;

 thermally annealing the nitrogen within the nitrogen-enriched region, while the bare upper surface of the silicon-oxide-containing layer remains bare, to bond at least some of the nitrogen to silicon proximate the nitrogen; the nitrogen-enriched region remaining confined to the upper half of the silicon-oxide-containing layer during the annealing; and

 wherein the nitrogen-enriched region is formed only in the upper third of the silicon-oxide-containing layer by the exposing and remains confined to the upper third of the silicon-oxide-containing layer during the annealing.

Claim 12-13 (cancelled).

Claim 14 (previously presented): The method of claim 11 wherein the nitrogen-enriched region is formed only in the upper fourth of the silicon-oxide-containing layer by the exposing and remains confined to the upper fourth of the silicon-oxide-containing layer during the annealing.

Claim 15 (previously presented): The method of claim 11 wherein the nitrogen-enriched region is formed only in the upper fifth of the silicon-oxide-containing layer by the exposing and remains confined to the upper fifth of the silicon-oxide-containing layer during the annealing.

Claim 16 (previously presented): The method of claim 11 wherein the silicon-oxide-containing layer is maintained at a temperature of less than 200°C during the exposing.

Claim 17 (original): The method of claim 11 wherein the plasma is maintained with a power of from about 500 watts to about 5000 watts during the exposing.

Claim 18 (original): The method of claim 11 wherein the exposing occurs within a reactor, and wherein a pressure within the reactor is from about 5 mTorr to about 10 mTorr during the exposing.

Claim 19 (original): The method of claim 11 wherein the exposing occurs for a time of less than or equal to about 1 minute.

Claim 20-47 (cancelled)

Claim 48 (previously presented): The method of claim 11 wherein the thermal annealing comprises thermal processing at a temperature of about 700°C for a time of about 30 seconds.

Claim 49 (previously presented): The method of claim 11 wherein the thermal annealing comprises thermal processing at a temperature of about 1050°C for a time of about 5 seconds.

Claim 50 (previously presented): The method of claim 11 wherein the thermal annealing comprises rapid thermal processing at a ramp rate of at least about 50°C/sec to a process temperature of less than 1000°C, with the process temperature being maintained for at least about 30 seconds.